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April 14, 1994 94-RF-04333

Robert H. Birk
Environmental Restoration Division
DOE, RFO

TRANSMITTAL OF RESPONSES TO COMMENTS ON TECHNICAL MEMORANDUM (TM) 1, FINAL WORK PLAN FOR OPERABLE UNIT (OU) 3 REMEDIAL INVESTIGATION (RI) – MSB-016-94

Attached please find the above referenced response to comments. These responses address Environmental Protection Agency and Colorado Department of Health comments regarding deviations from the RI work plan. Informal discussions with the agencies indicate that they are in agreement with these responses and will approve TM 1 when the responses have been formally transmitted. The matrix included with the comments is done in the format which will be used in the OU 3 RI report.

These comment responses were submitted in a letter dated March 1, 1994 (94-RF-02564). It has been requested that these responses be transmitted again to the Department of Energy.

If you have any questions or need additional information, please contact me.

Mark S. Buddy
Acting Operable Unit 3 Project Manager
Remediation Project Management

jlm

Orig. and 1 cc – R. H. Birk

Attachment:
As Stated

A-0003-000321

Comment Response to
Draft Technical Memorandum No. 1
OU 3

COMMENT RESPONSE

1. **Comment 1a:** Changes to the sediment sampling program have not been adequately described. Page 10, Section 2 states that sediment locations were adjusted based on field conditions. A map (Figure 2-3) was provided to illustrate the final sediment sample locations. A total of 54 sediment sample locations are shown. However, 64 sediment sample locations were proposed (29 in drainage and ditches, and 35 in reservoirs). The effect on the power of the study by the apparent deletion of 10 sediment samples should be explained. The original sample size was chosen to achieve 80 percent power.

   Comment Response 1a: The work plan established a target of 80 percent power for OU 3 data. The sample numbers presented in the OU 3 work plan were based on 90 percent power. In the work plan, 10 drainage locations were proposed for both the Walnut Creek and Woman Creek drainage areas. To evaluate Mower, 5 locations along Mower Ditch and 5 nearshore sediment locations around Mower Reservoir were proposed. These sample sizes were selected to achieve a 90 percent power.

   During the OU 3 field sampling program, a total of 104 sediment locations were sampled: 24 drainage/ditch locations, 34 nearshore sediment locations, and 46 reservoir sediment locations. Eight locations were sampled along drainages associated with Walnut Creek. The sediment data from the sample location at Walnut Creek along Indiana Street (SED003) could also be added to the data set. Along the Woman Creek drainage area, 11 locations were sampled. At Mower, 5 locations were sampled along Mower Ditch and 4 nearshore locations were sampled. The effect on power will depend on how the data are aggregated.

2. **Comment 1b:** Other observed changes to the sediment sampling include:

   * Near shore sediment samples were collected when the reservoir water level was high rather than low as proposed in the work plan. This introduces uncertainty as to whether the data quality objectives for those samples were achieved.

   * Three or four vertical profile samples, rather than one, were collected at Standley Lake. Vertical profile samples were only submitted for plutonium analysis, where as the work plan proposed plutonium, americium, and uranium analyses.

Comment Response 1b: The nearshore sediment samples were collected when the reservoir water level was low. Standley Lake nearshore sediment sampling began immediately following the Great Western Reservoir sampling. However, during the nearshore sediment sampling at Standley Lake, the reservoir water level did begin to rise. Sampling was stopped and resumed later in the summer after the water level was lower. Additionally, at Great Western Reservoir, a comparison will be made between the nearshore sediment grab samples and the reservoir sediment grab samples. This comparison will provide information on how radiological concentrations at the sediment surface vary through the reservoir (whether exposed or unexposed). These concentrations will be evaluated as to potential risk in the risk assessment.

The vertical core samples collected in Standley Lake, Great Western Reservoir, and Mower Reservoir **were** all analyzed for plutonium, americium, and uranium as specified in the work plan. Vertical core samples were collected during both the nearshore sampling and reservoir sampling. A total of 20 vertical core locations were sampled, 8 locations during the nearshore sampling and 12 locations during the reservoir sampling. The nearshore samples were collected from 0-6 inches in 1-inch increments as specified in the work plan. The reservoir core samples were collected in two-inch increments to depths of approximately 30 inches, if core retrieval permitted. Five additional core samples above what was specified in the work plan were collected during the nearshore sediment sampling (Standley Lake - 3 core locations, Great Western Reservoir - 2 core locations). Two additional vertical core locations above what was specified in the work plan were sampled in Great Western Reservoir during the reservoir sampling.

The additional core samples were collected to meet the objectives described in the work plan. Additional vertical samples were collected near the water line to allow for the comparison on how radiological concentrations at the sediment surface vary through the reservoir and to provide more information for the evaluation of nature and extent of contamination. The two additional vertical reservoir core locations in Great Western Reservoir were added to confirm high detections of plutonium in sampling performed by the City of Broomfield that had occurred since the work plan had been approved.

3. **Comment 2:** Observation of the reservoir sediment sampling activities also revealed some modifications to the work plan. The following deviations were not described in Technical Memorandum 1:

    * Four rather than three profile samples were collected in Great Western Reservoir.

    * Recovery of a full 30 inches of core was not possible at every location.

* A sampler was designed for Mower Reservoir because the gravity samples did not work in shallow water.

* Twenty rather than 15 grab samples were collected at Great Western Reservoir.

* Samples were analyzed for metals and radionuclides.

Comment Response 2: As discussed in Comment Response 1b, additional profile locations were selected in Great Western Reservoir to address recent plutonium detections.

Core recovery from the reservoir sediment sampling ranged from 6 inches to 36 inches. The average recovery was 18.3 inches. The work plan states that "depending on the density of the substrate and weight of the cores, penetration rates of 30 inches can be attained." The work plan also states that if core recoveries are low, field personnel will select appropriate sample intervals. This statement indicates that it was anticipated that field conditions may prevent recoveries of 30 inches.

Because of field conditions in Mower Reservoir, the gravity corer was not used. Mower Reservoir was less than 6 feet deep so the gravity sampler used in Standley Reservoir and Great Western Reservoir was not practical. The core sampler used was manually driven into the sediments. Core recovery from this method was comparable to the gravity core and ranged from 9.5 to 22 inches.

Twenty grab sediment samples were collected from Great Western Reservoir, however five samples were held in storage and not sent to the laboratory for analysis. Additional samples were also collected at Standley Lake and Mower Reservoir and held in storage. None of these samples were sent to the laboratory for analyses. The samples were collected and held in storage in case the 1983 and 1984 historical Rockwell sediment data could not be incorporated into the data set. As specified in the work plan, a statistical comparison between the OU 3 data and the historical data was to be performed. The results of the comparison indicate the historical data can be combined with the OU 3 data to achieve a power of 80 percent. Therefore, the samples held in storage were not analyzed.

It should be noted that metals and radionuclides were requested for all sediment samples, including the vertical core samples from the reservoirs. The work plan only specified radionuclides for the vertical core analyses. The metal analyses were requested to evaluate how metal concentrations vary with depth in the sediment cores. Specifically, the metal data will be used to evaluate redox conditions at the sediment/water interface, assess mobility of metals, evaluate movement of metals in sediments to the water column, and compare results to

previous studies.

4. **Comment 3a:** Figure 2-3 also illustrates 10 surface water sampling locations. The work plan described a total of 25 surface water samples (3 existing surface water locations, 7 drainage samples and 15 reservoir samples). Deviations in the number of samples collected should be described.

Comment Response 3a: Six drainage/ditch surface water locations were sampled. Less drainage/ditch surface water locations were sampled than specified in the work plan because there were no surface water flows at many locations. The field conditions observed during sampling confirm the intermittent nature of surface water flows in the creeks and drainages at OU 3. Twenty-seven reservoir surface water locations were sampled. Additional surface water locations were sampled to co-locate with biota sampling. During the biota sampling of Standley Lake additional locations were added to obtain representative samples. Due to the size of the reservoir systems and the extent of the area covered during the aquatic biota sampling, it was determined that an increased number of abiotic samples (surface water) were needed to characterize the system.

5. **Comment 3b:** Some other variations in the surface water program were also noticed by EPA and its contractor during field oversight:

* The analytical suite for reservoir surface water samples was expanded to include sulfide, major anions, and oil and grease.

* Reservoir surface water samples were only collected in late summer 1992. The work plan proposed collecting samples during both high and low reservoir capacity.

* Drainage and ditch surface water samples were to be collected during spring runoff, but most sampling did not begin until June 1992.

* The Broomfield diversion ditch water was moved.

Comment Response 3b: Major cations/anions were specified in the work plan for surface water analyses. Sulfide and oil and grease analyses were added to be consistent with analyses from other OUs and to be consistent with SOPs for surface water sampling.

Reservoir surface water sampling occurred in July, September, and October. Surface water sampling did not occur during the highest and lowest capacity. However, based on historical data along Indiana Street and from the Cities, differences in concentrations have not been observed.

Drainage/ditch sampling did not occur until early June primarily due to contractual constraints. However, based on field reconnaissance in April and May, no significant spring runoff flows occurred.

The Broomfield Diversion Ditch was moved because based on field conditions (no flow was present at the proposed location). The location was moved to the eastern portion of the ditch where there was surface water flow.

6. **Comment 4:** Although the 1992 environmental evaluation sampling did not begin until June, there was an opportunity to sample in the spring of 1993. The current sampling program will not provide any information of seasonal variation. Further information should be included regarding the reasons spring sampling and seasonality issues are no longer a concern.

Comment Response 4: Two environmental sampling events were performed by OU 3. The sampling events were separated by 3 to 5 weeks. These two sampling events are anticipated to provide sufficient information to evaluate environmental impacts and adequately characterize OU 3. Seasonal influences will not be able to assessed. Seasonal influences were not considered to contribute significantly to the biotic and abiotic characteristics of the investigated areas because:

- The low levels of chemicals of concern would unlikely be affected by flow conditions because of the chemical and physical nature of the chemicals of concern (i.e., they are not soluble and tend to sorb to organic matter and solid surfaces thereby removing them from the bioavailable water fraction).

- The flow conditions are the result of natural (runoff) and man-made (channel diversion, irrigation, etc.) influences. It would therefore be difficult to predict and schedule sampling events that correspond to these flow changes. Since these systems are subject to these dynamic flow conditions it was assumed that the abiotic and biotic characteristics that are affected would be difficult to identify.

- The presence of biotic components within OU 3 is largely controlled by factors other than flow regimes. The occurrence of fish populations is affected predominantly by fishing pressure and stocking practices.

7. **Comment 5:** Section 3.1.1 and 3.1.2, page 3-7: These two sections discuss characterizing the study area and conducting screening tests. Section 3.1.2 states that screening tests must be performed in areas of known contaminant levels. Although it appears important to know the contaminant concentrations for sampling, no site specific data is referenced. The wind tunnel study results should

include site specific data to substantiate the chosen sample locations illustrated on Figure 3-3 and/or used in the actual study.

Comment Response 5: As stated on Table 3-1 in Technical Memorandum No. 1, the locations were selected based on data from the remedy acreage which has historically been of greatest concern. The wind tunnel results will be presented in the RI Report and will include results from soil plots located near the wind tunnel sites.

8. **Comment 6:** Section 4.3, page 4, paragraph 2: The text states that "...the data from the wind tunnel study, as well as the RAAMP program and the ultra high volume samplers will all be combined and used with atmospheric dispersion and radiation dosimetry. These models will be used to estimate risks at locations that are distant from OU 3 in the future use exposure scenarios." This approach, while technically adequate, is vague. EPA expects a more specific method for linking these data to be presented. It will be acceptable for this method to be included in the submittal of the technical memorandum describing the fate and transport models to be utilized in the OU 3 exposure assessment as required by paragraph VII.D.1.b of the Interagency Agreement.

Comment Response 6: Technical Memorandum No. 3 will address how the air pathway will be modelled using the RAAMP and wind tunnel results.

Table 2-1
SUMMARY OF OU 3 FIELD INVESTIGATIONS

Objective	Proposed Activity in OU 3 Work Plan	Analyses Requested During Field Investigation	Deviation From Work Plan	Completed Work
Characterize Nature and Extent of Soil Contamination				
1. Characterize lateral extent of soil contamination.	Collect surface soil samples using the CDH method and analyze samples for plutonium, americium, and uranium. A sampling grid based on geostatistics will be used.	Radionuclides (plutonium^{239}, americium^{241}, uranium$^{233/234, 238}$)	The Rocky Flats method and the CDH method were used to collect surface soil samples as described in TM No. 1. The RFP method was added to be able to compare OU 3 data to historical data. Both the CDH and RFP methods have been used in the past. TOC, specific gravity, and grain size analyses were not performed on the surface soils. These analyses were performed on the soil trenches. One additional soil plot was sampled over the number specified in the OU 3 Work Plan because of access agreement problems. An additional location was needed to get sufficient areal distribution.	Sixty-one surface soil plots were sampled between June 1992 and June 1993.

Table 2-1
SUMMARY OF OU 3 FIELD INVESTIGATIONS
(Continued)

	Objective	Proposed Activity in OU 3 Work Plan	Analyses Requested During Field Investigation	Deviation From Work Plan	Completed Work
2.	Characterize vertical extent of soil contamination.	Collect undisturbed soil samples from vertical profile to a depth of approximately 100 cm and analyze for plutonium, americium, and uranium.	Radionuclides (plutonium^{239}, americium^{241}, uranium$^{233/234, 235, 238}$) TOC General soil parameters	Dimensions of the trench were 4 ft × 9 ft × 4.5 ft deep. The block/staircase method for one wall of the trench was eliminated and careful measurements were employed to minimize cross contamination of the soils with depth as described in TM No. 1. Stainless steel template was not used to collect composite samples. Each sample level was clearly marked by placing 12-in.-long nails at the measured depths, and samples were composited horizontally at the marked sample depth. Samples were also analyzed for TOC – only on initial trench, and general soil parameters, parameters, including clay minerals, specific surface, and bulk density for each soil horizon identified.	Samples were collected from vertical soil profiles at eleven locations as specified in the Work Plan. At each trench samples were collected from 0-3, 3-6, 6-9, 9-12, 18, 24, 36, 48, 72, and 96 cm. Samples were also collected at each soil horizon.

Table 2-1
SUMMARY OF OU 3 FIELD INVESTIGATIONS
(Continued)

Objective	Proposed Activity in OU 3 Work Plan	Analyses Requested During Field Investigation	Deviation From Work Plan	Completed Work
Characterize Nature and Extent of Surface Water and Sediment Contamination				
3. Characterize potential plutonium, americium, uranium, TCL volatiles (Mower Reservoir only), and TAL metals in surface water reservoirs and surface water drainages/ditches.	Collect two rounds of water samples from five locations in Great Western Reservoir, Mower Reservoir, and Standley Lake and analyze for plutonium, americium, uranium, TAL metals, gross alpha, gross beta, atrazine, simazine, cations, and anions. Mower Reservoir will be analyzed for TCL volatiles. Drainage/ditch surface water samples are collected from existing monitoring stations along Indiana Street (SW001, SW002, and SW003). Additional surface water samples will be collected from Broomfield Diversion Ditch, Woman Creek, Smart Ditch, Walnut Creek, Big Dry Creek, Church Ditch (2), and Clear Creek Irrigation Ditch.	**Field Parameters –** Dissolved oxygen, hardness, pH, temperature, alkalinity, turbidity, and specific conductivity **Laboratory Analyses –** • Cation/anions • TAL metals (dissolved and total) • TCL volatiles (Mower Reservoir only) • Radionuclides (dissolved and total) • Herbicides (atrazine and simazine) • Oil and grease • Orthophosphate • Cyanide • Tritium (Great Western Reservoir only)	As described in TM No. 1, fewer surface water samples from the drainages/ditches were collected due to intermittent flow conditions; surface water samples were also analyzed for oil and grease, and hydrogen sulfide to be consistent with analyses from other OUs and to be consistent with SOPs for surface water sampling. Reservoir surface water sampling occurred in July, September, and October, rather than during high and low reservoir capacity.	A total of 53 surface water samples were collected from 33 locations. Surface water samples were collected from Standley Lake, Great Western Reservoir, and Mower Reservoir in July, September, and October 1992. Samples collected on July and October were co-located with sediment and biota sampling. Surface water samples collected in September were co-located with sediment core samples. Additional reservoir surface water samples were collected and co-located with biota samples to obtain representative samples. Six drainage/creeks locations were sampled during the surface water investigation: Walnut Creek, Dry Creek Valley Ditch, Woman Creek, Broomfield Ditch, Big Dry Creek, and Coal Creek.

Table 2-1
SUMMARY OF OU 3 FIELD INVESTIGATIONS
(Continued)

Objective	Proposed Activity in OU 3 Work Plan	Analyses Requested During Field Investigation	Deviation From Work Plan	Completed Work
4. Characterize the potential horizontal extent or surficial plutonium, americium, uranium, TCL volatiles, and TAL metals contamination in drainages/ditches and reservoir sediments.	A total of 29 sediment sampling locations will be sampled from drainage/ditch locations at Walnut Creek, Broomfield Diversion Ditch, Woman Creek, Church Ditch, stations along Indiana Street, Clear Creek Irrigation Ditch, Smart Ditch, and Big Dry Creek. A total of 38 sediment sampling locations will be sampled from Mower Reservoir (5), Great Western Reservoir (15), and Standley Lake (18). All sediments are to be analyzed for plutonium, americium, uranium, gross alpha/beta, TAL metals, and cyanide. Mower Reservoir sediments are to be analyzed for TCL volatiles. Great Western Reservoir sediments are to be analyzed for tritium.	Radionuclides TAL metals TCL volatiles (Mower Reservoir only) Tritium (Great Western Reservoir only) Cyanide TOC Specific gravity Grain size	Eight sediment samples were collected along drainages associated with the Walnut Creek drainage area. Ten were proposed in the Work Plan. Along Woman Creek, 11 locations were sampled. At Mower, five locations were sampled along Mower Ditch, and four nearshore locations were sampled. The effect on power depends on how the data are aggregated. Sediment sample locations were different than specified in the Work Plan because field conditions varied. Drainage samples were collected at Coal Creek, Smart Ditch, Walnut Creek, Church Ditch, Big Dry Creek, Woman Creek, and Broomfield Diversion Ditch.	A total of 24 drainage/ditch sediment locations were sampled during the OU 3 field investigation. In addition, 46 reservoir locations were sampled. Several sediment locations were sampled twice, once in July and once in October.

Table 2-1
SUMMARY OF OU 3 FIELD INVESTIGATIONS
(Continued)

	Objective	Proposed Activity in OU 3 Work Plan	Analyses Requested During Field Investigation	Deviation From Work Plan	Completed Work
5.	Characterize potential vertical extent of radionuclide and metal contamination in reservoir sediments.	Sample a total of 10 vertical profile reservoir sediment locations using a gravity coring device at the three reservoirs and analyze them for plutonium, americium, and uranium. Three cores will be taken at Great Western Reservoir and Mower Reservoir, and four at Standley Lake.	Radionuclides Gross alpha/beta Cesium^{137} Polonium^{210} TAL metals Cyanide	Cesium^{137}, polonium^{210}, TAL metals, and cyanide were added to the list of analyses for the vertical core samples. The Cesium^{137} and polonium^{210} analyses were added to help age-date the core. Metals and cyanide were added to evaluate redox conditions at the sediment/water interface, assess mobility of metals, evaluate movement of metals from sediment to the water column and compare results to previous studies. Because of the shallow depth of water at Mower Reservoir, the coring device was manually driven. Recovery of a full 30 inches of core was not possible at every location because of substrate conditions.	A total of 12 vertical core samples were collected: 4 from Standley Lake, 5 from Great Western Reservoir, and 3 from Mower Reservoir.

Table 2-1
SUMMARY OF OU 3 FIELD INVESTIGATIONS
(Continued)

Objective	Proposed Activity in OU 3 Work Plan	Analyses Requested During Field Investigation	Deviation From Work Plan	Completed Work
			Additional cores were collected from Standley Lake and Great Western Reservoir to provide more information for the evaluation of nature and extent of contamination. Also, the two additional vertical core samples collected from Great Western Reservoir will allow evaluation of detections of plutonium by the City of Broomfield that occurred after the Work Plan was approved.	

Table 2-1
SUMMARY OF OU 3 FIELD INVESTIGATIONS
(Continued)

Objective	Proposed Activity in OU 3 Work Plan	Analyses Requested During Field Investigation	Deviation From Work Plan	Completed Work
6. Characterize potential plutonium, americium, and uranium entrapment of sediments exposed along the reservoir shoreline and near-shore sediments.	Collect sediments samples along the reservoir shorelines of Great Western Reservoir (15), Mower Reservoir (15), and Standley Lake (5). In addition, one vertical profile samples was proposed at each reservoir.	Radionuclides Gross alpha/beta TAL metals Cyanide TCL volatiles (Mower Reservoir only) TOC, specific density, and grain size	Four near-shore sediment locations were sampled along Mower Reservoir instead of five. Four vertical profile samples were collected at Standley Lake and three at Great Western Reservoir to a depth of 6 inches instead of one. The additional core samples collected closer to the water line at Standley Lake and Great Western Reservoir were collected to allow for the comparison on how radiological concentrations at the sediment surface vary through the reservoir (whether exposed or unexposed).	Thirty-four near-shore sediment locations were sampled. At eight of the locations, a vertical profile sample was also collected from 0-1 inch, 1-2 inches, 2-3 inches, 3-4 inches, 4-5 inches, and 5-6 inches.

Table 2-1
SUMMARY OF OU 3 FIELD INVESTIGATIONS
(Continued)

Objective	Proposed Activity in OU 3 Work Plan	Analyses Requested During Field Investigation	Deviation From Work Plan	Completed Work
Characterize Hydrogeology				
7. Characterize potential contamination in the groundwater from sediment/ groundwater interactions and surface water/ groundwater interactions if present.	Collect groundwater samples from groundwater monitoring wells located downgradient of both Great Western Reservoir and Standley Lake.	Radionuclides Cations/anions Nitrates TAL metals	Metals were analyzed in the groundwater samples (they were not specified in the OU 3 Work Plan). The metal analyses were included to be consistent with analyses from the comprehensive RFP environmental monitoring.	

Table 2-1
SUMMARY OF OU 3 FIELD INVESTIGATIONS
(Continued)

Objective	Proposed Activity in OU 3 Work Plan	Analyses Requested During Field Investigation	Deviation From Work Plan	Completed Work
Characterize Air Pathway				
8. Characterize particularities in air.	Collect discrete air samples from exposed reservoir sediments and vegetated soil area using a wind tunnel and analyze air samples for plutonium, americium, and uranium. Two continuous air samplers will also be installed near Standley Lake. Existing RAAMP samplers located in the community will be used for background data evaluations.	Radionuclides		Wind tunnel studies are complete.
Characterize Ecological Setting: Terrestrial Biota				
9. Characterize vegetation types.	Conduct field reconnaissance for species and cover using quadrant sampling.	Field surveys	None	Nine sites (four to eight transects each) of belt transects and point intercept; 13 sites (five plots each) of releve and production plots plus three additional production plots.
10. Characterize animal species and populations.	Conduct field surveys for major species of mammals, birds, and reptiles.	Field surveys	None	13 small mammmal grid trappings; 10 quantitative and 8 qualitative bird surveys; 12 qualitative herpetologic surveys.

Table 2-1
SUMMARY OF OU 3 FIELD INVESTIGATIONS
(Continued)

Objective	Proposed Activity in OU 3 Work Plan	Analyses Requested During Field Investigation	Deviation From Work Plan	Completed Work
11. Characterize wetlands/riparian zones.	Conduct qualitative survey for types, size, location, and major species.	Field surveys	None	Five qualitative surveys were conducted.
12. Assess bioaccumulation in vegetation.	Analyzes tissue samples from aboveground plant biomass for plutonium, americium, and uranium.	Radionuclides	Added three vegetation sampling locations to increase sample numbers for analysis based on review of early data from OU 1 and OU 2 as stated in TM No. 1.	65 samples were collected at 13 sites.
13. Assess bioaccumulation and concentration in wetland vegetation.	Analyze tissue samples for plutonium, americium, uranium, and TAL metals.	TAL metals, Radionuclides	As stated in TM No. 1, wetland vegetation was not sampled due to disturbance, heterogeneity, water management, and irrigation currently impacting wetlands.	None
14. Assess bioaccumulation in small mammals.	Analyze tissue samples for plutonium, americium, and uranium.	Radionuclides	Added three additional small mammal trapping grids to increase sample numbers for analysis based on review of early data from OU 1 and OU 2 as stated in TM No. 1.	41 samples were collected at 13 sites.

Table 2-1
SUMMARY OF OU 3 FIELD INVESTIGATIONS
(Continued)

Objective	Proposed Activity in OU 3 Work Plan	Analyses Requested During Field Investigation	Deviation From Work Plan	Completed Work
Characterize Ecological Setting: Aquatic Biota				
15. Characterize benthic macroinvertebrate communities in creeks and reservoirs.	Collect quantitative, semi-quantitative, and qualitative samples. Identify dominant taxa and enumerate. Identify trophic types and spatial distribution.	Species identification Enumeration	Two additional OU 3 creek locations were intended to be sampled. Flow regimes prohibited sampling at these locations.	Benthic macroinvertebrate sampling was conducted in Woman Creek, Walnut Creek, Big Dry Creek, Great Western Reservoir, Mower Reservoir, and Standley Lake. Samples were collected at one station per creek and three to four locations per reservoir.
16. Measure ecological endpoints in benthic macroinvertebrate communities and assess bioaccumulation.	Collect replicate grab samples and dip net or kick net samples. Analyze ecological endpoints. Measure bioaccumulation in tissue.	None	Bioaccumulation in tissue was not performed. Adequate tissue mass could not be obtained to meet analytical requirements.	Benthic macroinvertebrate sampling was conducted in Woman Creek, Walnut Creek, Big Dry Creek, Great Wester Reservoir, Mower Reservoir, and Standley Lake, using Ponar grab sampling techniques.
17. Characterize periphyton in creeks.	Collect qualitative samples from natural substrates within creeks.	Relative abundance of major taxa	Work not performed because flow regimes prohibited periphyton sampling in creeks.	

Table 2-1
SUMMARY OF OU 3 FIELD INVESTIGATIONS
(Continued)

Objective	Proposed Activity in OU 3 Work Plan	Analyses Requested During Field Investigation	Deviation From Work Plan	Completed Work
18. Characterize periphyton communities and determine colonization rates in reservoirs.	Collect periphyton on artificial substrates in reservoirs. Identify major types and determine relative abundance. Measure biomass.	Biomass Algae density Taxonomic identification	None.	Quantitative periphyton sampling was conducted in the Fall 1992 at Great Western Reservoir, Mower Reservoir, and Standley Lake using floating artificial substrate samplers.
19. Characterize fish communities in creeks and reservoirs.	Collect fish with seines, nets, and electroshocking techniques. Identify, enumerate, and measure common species. Determine relative abundance and trophic types.	Species identification Species enumeration Observation of incidence of disease	Fish were not collected from streams during sampling efforts in Fall 1992 because of low flows.	Fish sampling was conducted in Woman Creek, Walnut Creek, and Big Dry Creek in the Spring of 1992 using electroshocking techniques, and fish were collected from Great Western Reservoir, Mower Reservoir, and Standley Lake using gill nets and boat electroshocking techniques.

Table 2-1
SUMMARY OF OU 3 FIELD INVESTIGATIONS
(Concluded)

Objective	Proposed Activity in OU 3 Work Plan	Analyses Requested During Field Investigation	Deviation From Work Plan	Completed Work
20. Measure ecological endpoints in fish communities and assess bioaccumulation and toxicity of contaminants.	Collect fish with seines, nets, and electroshocking techniques. Identify, count, measure, and weigh. Analyze ecological endpoints of bioaccumulation of potential COCs in tissue. Test water/sediments for toxicity.	Species identification Enumeration Total length and weight Tissue analysis for radionuclides and metals	Fish were not collected from streams during sampling efforts in Fall 1992 because of low flows.	Fish sampling was conducted in Woman Creek, Walnut Creek, and Big Dry Creek in the Spring of 1992 using electroshocking techniques and fish were collected from Great Western Reservoir, Mower Reservoir, and Standley Lake using gill nets and boat electroshocking techniques. Samples of tissue collected from fish from reservoir and lakes were analyzed for radionuclides and metals.